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VACET Software Engineering Group's Progress Report: March 2007

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VACET Software Engineering Group's Progress Report: **March 2007¹**

Hank Childs, VACET Chief Software Engineer
April 6, 2007

Each document in this series will summarize a teleconference of the VACET Software Engineering Group (SEG), which in turn summarizes the progress of the previous month. For March 2007, the teleconference took place on April 4th.

<i>Participant</i>	<i>Organization</i>
Sean Ahern	ORNL
Hank Childs	LLNL
Marty Cole	UUtah
Jeremy Meredith	ORNL
Gunther Weber	LBL

Organizational updates:

There are no formal organizational updates. Ken Joy has confirmed the identity of the post-doc he will have serve as a member of the SEG. That individual will be starting in July.

Technical updates:

The teleconference consisted of a series of site reports from each of the four participating sites. Technical discussions about the work being done at each site took place during each site report.

LBL update: Gunther (and Hank) met with Vince Beckner and Terry Ligocki on Tuesday April 3rd. The purpose of the meeting was to ensure that the deliverables for FY07 in the area of AMR/APDEC were appropriate and also to ensure that the plans for deploying this functionality in VisIt would

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be acceptable to the stakeholders. The meetings confirmed that VACET has the right set of deliverables to replace ChomboVis, but that AMRVis may be further out. More information about AMRVis will be placed on the Wiki.

Gunther has been working on a SurfaceLIC plugin for VisIt. Hank and Gunther jointly worked on infrastructure to have a VisIt “plot” add filters to the “top of the pipeline”, which was required for this plot. Gunther has also been working on productizing the work of Louis Feng. He is targeting making this plot work with an isosurface operator or with a slice operator on the first pass and will address issues where there is a spatial transformation (i.e. displacement by a vector, etc) on a subsequent pass.

Gunther also has been interested in modifying the interface to the volume plot. He may attempt this in April and the group discussed transfer function editors in both VisIt and SCIRun. A follow-on conversation took place about multi-dimensional transfer function editors. Marty Cole said that SCIRun has separate transfer function editors for 1D and 2D and believes that will also make sense for VisIt. This is pertinent because the volume rendering work being done by Marty Cole (with future VisIt work to be done by Hank Childs) will require the VisIt interface to be extended for multi-dimensional transfer functions.

LLNL update: Hank has continued to move forward on converting VisIt to Subversion, which will allow external VisIt developers (i.e. Meredith, Ahern, and Weber) to modify the code. Through this process, Hank has been coordinating with David Skinner of the SciDAC Outreach Center. Hank also has been working with Gunther, as mentioned in the LBL update section. (Hank was on travel for a portion of March and did not charge VACET accounts.)

ORNL update: Sean Ahern has been getting data sets from the fusion community. They would like to do Poincare analysis with VisIt. Jeremy Meredith finished some parallel axis improvements, but is moving onto GTC. Sean thinks the parallel axis work is important and will benefit many people, but there is not customer involved. Sean also did work for Jackie Chen, but Jackie's current SciDAC status is unclear.

UCDavis update: There are currently no members of the SEG from UCDavis.

UUtah update: Marty continues to make progress on isolating the Utah volume rendering code. He now has the library in a compilable, linkable state. He does not consider it to be in a “functional” state. The distinction being that the VisIt work could start in terms of linking and merging interfaces, but he does not believe it will yet produce good pictures. He has gotten a version of SCIRun to work with the library, but is continuing to run into issues with OpenGL. Marty is continuing to make good progress.

In an offline conversation, Hank and Marty reached the following conclusions regarding the merge with VisIt: the issue of merging/sorting results in a parallel, distributed memory setting is difficult. For the first iteration, they plan to use VisIt's existing sampling code to construct texels that are partitioned over screen space and hand those texels to the volume rendering library. This will have two benefits: (1) instantly improving the picture quality produced by VisIt and (2) shake out software engineering issues with VisIt linking against the library. It will not, however, significantly affect VisIt's slow performance for ray casted volume rendering. After that, Marty and Hank will then start discussing how to make the library directly handle the parallel, distributed memory case, rather than relying on VisIt's existing (and slow) algorithms to do sampling and data partitioning. The solution that Marty and Hank arrive at will likely be tailored to rectilinear/AMR grids, which is likely sufficient. The goal of this followup effort will be to achieve considerably faster rendering rates.